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(54) **Rotor for a loop-forming head**

Rotor für Drahtschlingenlegekopf

Rotor pour tête de formation de boucles

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Description

[0001] This invention concerns a rotor for a loop-forming head, as set forth in the main claim (see for example EP-A-0 087 137).

[0002] The loop-forming head to which this invention is applied has a substantially standard structure and conformation and cooperates upstream with a drawing means and with a bar-feeding channel and downstream with a conveyor belt to receive loops or with another means suitable to receive loops.

[0003] The rotor of the loop-forming head according to the invention can reach rotation speeds of 160 to 170 metres per second and more.

[0004] In the description that follows, by speed of rotation is meant the peripheral speed of an end of the diameter of the bore of the outlet tube for the loops from the loop-forming head.

[0005] In the present state of the art the rotor of the loop-forming head is generally supported on conventional rolling-type bearings.

[0006] In this particular case of application it has been found that such rolling-type bearings enable a maximum speed of about 140 to 145 metres per second to be reached; these speeds are now inadequate in view of the ever higher speeds of feed of the bars which, on leaving the rolling train, have to be wound in loops.

[0007] In this connection new solutions of rolling-type bearings are being studied and enable adequate speeds of at least about 150 to 160 metres per second to be attained, but these studies have so far not produced results which are completely satisfactory.

[0008] In attempting to achieve those speeds, EP-A-0290249 has disclosed an embodiment in which the loop-forming head includes a first hollow shaft rotatably fitted in a first set of bearings secured to a stationary structure and a second hollow shaft, which is associated with the loop-forming head and rotates in a second set of bearings secured to the first hollow shaft.

[0009] The two hollow shafts rotate in the same direction but at different speeds; the speed of the second hollow shaft and therefore of the loop-forming head associated with that shaft is equal to the difference in speed between the first and second shafts plus the difference in speed between the first shaft and the stationary structure.

[0010] This embodiment has the effect that each set of bearings withstands only a part of the speed of rotation of the loop-forming head.

[0011] The teaching of this prior art document, while it represents a development as compared to the then state of the art, causes great constructional and working complications, heavier costs, a greater number of heavily stressed elements and therefore greater wear and greater need of maintenance.

[0012] Furthermore, the use of conventional rolling-type bearings requires continuous and constant lubrication owing to their contact with the rotating element.

[0013] Moreover, the rolling-type bearings possess modest capacities for the bearing of static and dynamic loads and also limited capacities of absorbing the vibrations which are generated, in this specific case for instance, by the imbalances due to wear of the loop-forming tube during the rolling.

[0014] Furthermore, the rolling-type bearings require constant maintenance and periodical replacement.

[0015] The present applicants have designed, tested and embodied this invention to overcome all the above shortcomings and to find a solution to the ever more urgent requirements of businessmen in this field, particularly as regards reliability, increase of speed, reduction of vibrations and maintenance, etc.

[0016] This invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

[0017] The purpose of the invention is to embody a loop-forming head which can reach speeds of rotation of 160 to 170 metres per second or more and of which the rotation mechanism requires little or no maintenance or lubrication.

[0018] Another purpose of the invention is to employ a rotation mechanism suitable to absorb efficiently any type of vibration and having a high load-bearing capacity under both static and dynamic conditions.

[0019] The loop-forming head to which the rotor of this invention is applied has a substantially standard structure and conformation and can include an actuation system with an independent motor or with an external motor and with an actuation system employing a bevel gear pair.

[0020] In the loop-forming head are conventionally defined an inlet side facing the bar-feeding channel and an outlet side facing the outlet of the bars and positioned on the opposite side of the drive system of the rotor in relation to the inlet side.

[0021] According to the invention at least one radial bearing of a magnetic type is installed in cooperation with the rotor of the loop-forming head and is positioned in cooperation with the outlet side for the bars, whereas a conventional rolling-type bearing is included in cooperation with the inlet side for the bars.

[0022] According to a variant a radial magnetic bearing is also installed in cooperation with the bar inlet side.

[0023] According to another variant at least one magnetic bearing of an axial type is installed at least in cooperation with the bar inlet side.

[0024] The magnetic bearings, owing to their peculiar technological properties, make possible the improvement of performance in terms of speed of rotation, reduced maintenance and lubrication, load-bearing capacity and absorption of vibrations.

[0025] According to the invention an initial setting system may be included to determine the correct axial position of the rotor of the loop-forming head in the transient moment of start-up.

[0026] The attached figure is given as a non-restrictive

example and, with a preferred embodiment, shows diagrammatically a lengthwise section of a loop-forming head to which is applied a rotor with magnetic bearings according to the invention.

[0027] A loop-forming head 10 shown in the attached figure cooperates upstream and downstream with means (not shown here) for drawing and feeding bars, for instance a channel, and with means to remove loops, for instance a conveyor to remove loops.

[0028] The loop-forming head 10 comprises conventionally in its upstream part an axially-bored intake tube 11, which acts as a rotor for the loop-forming head 10 and is set in rotation at a very high speed.

[0029] A bar 12 emerges from the intake tube 11 and is wound by known means about an axial shaft 13 to form a loop.

[0030] The loop-forming head 10 is defined by a first segment referenced with 27, which coincides substantially with the intake tube 11 and in which the bar 12 is guided along a substantially axial development, and by a second segment 28, in which the spiral development of the bar 12 begins or has just began.

[0031] The figure shows diagrammatically two possible alternative systems for actuation of the loop-forming head 10.

[0032] The intake tube 11 can be associated with an independent drive motor 14 (shown in the lower part of the figure) or can cooperate with an external motor (not shown in the figure), which is associated with means 15 transmitting actuation with a bevel gear pair (shown in the upper part of the figure).

[0033] According to the invention a radial bearing 17 of a magnetic type is installed at least in cooperation with the outlet side 16 of the intake tube 11.

[0034] The figure shows diagrammatically a core 21 and windings 22 which constitute the magnetic bearing 17.

[0035] The magnetic bearing 17 includes a housing 23 solidly associated with the intake tube 11 by means of suitable clamping means 24.

[0036] A conventional rolling-type ball-bearing or roller bearing 19, of an oblique type for instance, may be included in cooperation with the inlet side 18 of the intake tube 11, as shown diagrammatically in the lower part of the figure.

[0037] According to the variant shown diagrammatically in the upper part of the figure, a radial magnetic bearing 20 is installed in cooperation with the inlet side 18 of the intake tube 11.

[0038] According to a further variant, a magnetic bearing of an axial type 25 is installed in cooperation with the inlet side 18 of the intake tube 11.

Claims

1. Rotor for a loop-forming head (10), which includes at least one axially-bored intake tube (11) with a relative inlet side (18), the tube (11) cooperating with bar feeding means (12), and at least one axial shaft (13), which winds bars and is associated with the outlet side (16) of the intake tube (11) and cooperates with coil-removal means, the loop-forming head (10) being able to include independent drive means (14) or actuation means (15) associated with external means, the rotor being characterised in that magnetic bearing means of a radial type (17) are included at least in cooperation with the outlet side (16) associated with the terminal part (26) of the intake tube (11).

2. Rotor for a loop-forming head (10) as in Claim 1, in which magnetic bearing means (20) of a radial type are included in cooperation with the inlet side (18) of the intake tube (11).

3. Rotor for a loop-forming head (10) as in Claim 1 or 2, in which magnetic bearing means (25) of an axial type are included at least in cooperation with the inlet side (18) of the intake tube (11).

Patentansprüche

1. Rotor für einen Schleifenbildungskopf (10), mit mindestens einem mit einer axialen Bohrung und einer entsprechenden Einlaßseite (18) versehenen Einführungsrohr (11), das mit Stangenzuführungsmitteln (12) zusammenwirkt, und mit mindestens einer axialen Welle (13), die Stangen wickelt und mit der Auslaßseite (16) des Einführungsrohres (11) verbunden ist sowie mit Mitteln zur Abnahme der Schleifen zusammenwirkt, wobei der Schleifenbildungskopf (10) entweder selbständige Antriebsmittel (14) oder mit externen Mitteln zusammenwirkende Antriebsmittel (15) aufweist, **dadurch gekennzeichnet**, daß radiale Magnetlager (17) mindestens zum Zusammenwirken mit der dem Endteil (26) des Einführungsrohres (11) zugeordneten Auslaßseite (16) angeordnet sind.

2. Rotor für einen Schleifenbildungskopf (10) nach Anspruch 1, bei dem radiale Magnetlager (20) zum Zusammenwirken mit der Einlaßseite (18) des Einführungsrohres (11) angeordnet sind.

3. Rotor für einen Schleifenbildungskopf (10) nach Anspruch 1 oder 2, bei dem axiale Magnetlager (25) mindestens zum Zusammenwirken mit der Einlaßseite (18) des Einführungsrohres (11) angeordnet sind.

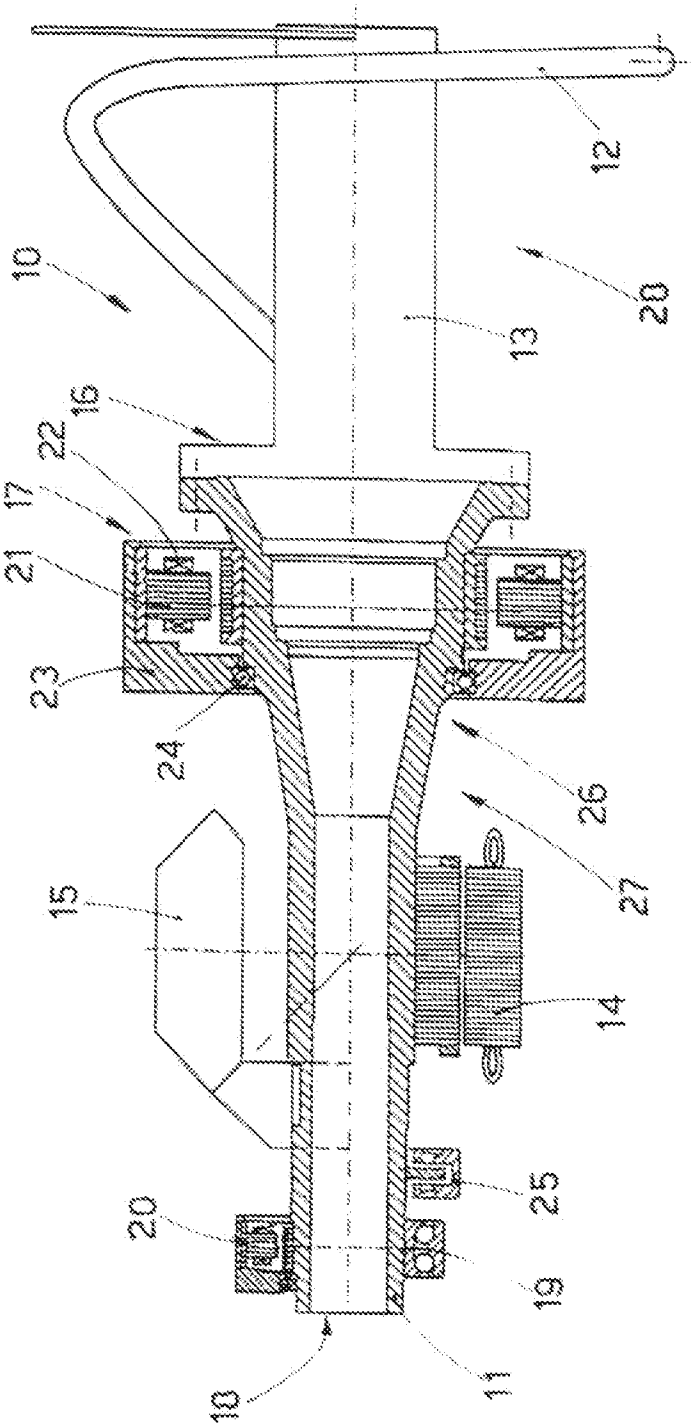
Revendications

1. Rotor pour une tête de formation de boucles (10), qui comprend au moins un tube d'admission (11) à alésage axial, avec un côté d'entrée relatif (18), le tube (11) coopérant avec des moyens d'amenée de

barres (12), et au moins un arbre axial (13) qui enroule des barres, qui est associé au côté de sortie (16) du tube d'admission (11) et qui coopère avec des moyens d'enlèvement de bobine, la tête de formation de boucles (10) étant capable de comprendre des moyens d'entraînement indépendants (14) ou des moyens d'actionnement (15) associés à des moyens externes, le rotor étant caractérisé en ce que des moyens formant palier magnétique du type radial (17) sont prévus au moins en coopération avec le côté de sortie (16) associé à la partie terminale (26) du tube d'admission (11).

2. Rotor pour une tête de formation de boucles (10) selon la revendication 1, dans lequel des moyens formant palier magnétique (20), du type radial, sont prévus en coopération avec le côté d'entrée (18) du tube d'admission (11).

3. Rotor pour une tête de formation de boucles (10) selon la revendication 1 ou 2, dans lequel des moyens formant palier magnétique (25) du type axial sont prévus au moins en coopération avec le côté d'entrée (18) du tube d'admission (11).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